IT JUST TASTES BETTER WHEN IT'S IN SEASON

A Dissertation

by

LAURA NICOLA THOMAS

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfilment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

May 2012

Major Subject: Nutrition

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Approved by:

Chair of Committee,	W. Alex McIntosh
Committee Members,	Jenna Anding
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ABSTRACT

It Just Tastes Better When It's In Season. (May 2012)

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Using focus group methodology, this research identifies the behavioural, normative and control beliefs associated with consuming a local diet. Using these findings as a platform, a questionnaire was developed to quantify attitudes, subjective norms, and perceived behavioural control, the theoretical constructs of the Theory of Planned Behaviour (TPB). In addition, moral obligations were measured for the first time in relation to local food consumption in an extended TPB model. The sample consisted of 114 individuals consuming various levels of local food in the Austin, TX area. Results indicate that perceived behavioural control and moral obligations had both a direct effect on intention to consume local food, as well as an indirect effect on intention, which is mediated via current behaviour. Dietary analysis was conducted using an online dietary assessment tool, the National Cancer Institute's Automated Self-Administered 24-hr recall. Between one and four recalls were collected from participants and a mean Healthy Eating Index (HEI) score was applied. Findings suggest that while controlling for age, sex, income and education, as the amount of local food in the diet increases, the total HEI score and the Dark Green and Orange Vegetables and Legumes (DOLs) component score also increases. In addition, the Saturated Fat component score

increases, indicating lower intakes of saturated fat are associated with higher local food intake. This suggests that saturated fat in the diet is being displaced by local vegetable intake, particularly DOLs.

DEDICATION

To my family; Dominic, Heather and Michael.

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NOMENCLATURE

ASA24	Automated Self-Administered 24-hr Recall
CG	Community Garden
CSA	Community Supported Agriculture
DOLS	Dark Green and Orange Vegetables and Legumes
FM	Farmers' Market
PBC	Perceived Behavioural Control
SN	Subjective Norms
TPB	Theory of Planned Behaviour

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1. INTRODUCTION: THE IMPORTANCE OF RESEARCH

In 2004, the term 'locavore' was coined by four women in the San Francisco Bay area. These women challenged themselves to only eat foods grown or harvested within a 100-mile radius of San Francisco for an entire month. [1] Since then, many have joined in and have extended the challenge to eat exclusively locally grown food year-round. In 2007, the word locavore was the Oxford American Dictionary Word of the Year [2] signifying the movement's increasing popularity, and although contention over the exact definition of the term exists, the word locavore conjures images of agrarian ideals that imply honesty, authenticity, and simplicity.

Those who participate in the local food movement may do so for a variety of reasons including environmental stewardship, supporting the local economy, and resisting globalisation. Many hold the belief that food, which has not travelled long distances to reach their plate, not only tastes better, but is also more nutritious. Those in the local food movement may grow food in their garden or at a community garden. Many procure their food from farmers' markets and community-supported agriculture. Food is often canned, pickled, or frozen in preparation for the winter months. Farmers' markets, defined as recurrent markets at fixed locations where farmers sell farm products, [3] offer

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This dissertation follows the style of *The Journal Of Nutrition Education and Behavior.*

direct access to a wide array of produce from local farmers, but more limited involvement in the growing process. In contrast, community gardens (which the American Community Gardening Association defines as "any piece of land gardened by a group of people") [4] more readily provide opportunities for community involvement and experiential education about growing, as well as opportunities to strengthen community ties and build social capital.

In August 2011, the United States Department of Agriculture announced that the 2011 National Famers' Market Directory boasts 7,175 operational farmers' markets (FM). This number represents a 17% increase over 2010, with approximately 1000 new markets opening for business in 2011. [3] Texas is home to 166 FMs, a 38% rise in markets over 2010. Parkins and Craig [5] offer an explanation as to why there has been an eruption of FMs in the US: "... farmers' markets have been seen as responses to a variety of social and economic factors: various food scares and increased consumer demand for quality produce of known provenance…increased interest in food and cooking generally (witness the rise of the celebrity chef); a greater awareness of local food and agriculture, often but not always linked to some degree of dissent from processes of globalisation". In tandem with the rise in number of FMs is the escalation in the number of community gardens that have sprung up all over the country. The American Community Gardening Association estimates that there are more than 18,000 community gardens in the US and Canada [4]

Both farmers' markets and community gardens offer important opportunities to partner

with public health programming efforts aimed at improving an array of nutrition-related outcomes, including nutrition knowledge, attitudes, and/or dietary intake. [6] However, little is known about the nutrition-related outcomes of following a largely local diet, nor the contribution that local food makes to improving fruit and vegetable intake.

Reviews of the literature reveal that individuals who purchase and consume locally produced food are typically female, have a higher income and are 40 years of age or older. [7] However, it has also been noted that psychosocial variables may be more influential than demographics as predictors for purchasing locally produced foods. [7,8] For instance, Bisonette and Contento [8] found that 31% of the variance in intention to buy or consume local food could be explained by psychosocial variables, as compared to 24% of the variance in intention to buy or consume organic food. It is therefore essential to convey educational messages that appeal to specific beliefs and attitudes about local food as opposed to a particular demographic.

The following work explores the psychosocial variables associated with local food consumption using the Theory of Planned Behaviour as a theoretical framework. In addition, this work assesses the contribution that local food makes in overall diet quality using the Healthy Eating Index 2005 (HEI-2005), which measures conformity to federal dietary guidance.

THEORETICAL FRAMEWORK – THE THEORY OF PLANNED BEHAVIOUR

Social psychologists have an interest in predicting peoples' behaviour based on their beliefs, attitudes and social influences. The Theory of Planned behaviour (TPB) is a socio-psychological theory that is widely used in nutrition and other health-related sciences to explain behaviour over which the individual has control. It is part of a class of models, which are characterised by rational choice [9,10]. The TPB assumes that attitudes are based on rational analysis of the potential outcomes of a behaviour [11] and that intentions are formed consciously based on calculated cost-benefit analysis of the consequences of the behaviour [11,12]. That is to say that people use an expectancy-value system when forming intentions to perform a given behaviour. The expectancy component refers to probability judgments, meaning, the likelihood of a positive or negative outcome of the behaviour. Value judgments refer to the perceived benefits or worth of the outcomes of the behaviour to the individual [11]. In other words expectancy-value models are the "perceived likelihood that performance of the behavior will lead to a particular outcome and evaluation of that outcome"[12].

In this case, the behaviour of interest is eating a locally sourced diet. The TPB is an augmentation of Ajzen and Fishbein's Theory of Reasoned Action (TRA) **[13]**, which was "the first model to produce consistent results suggesting a link between measured attitudes towards undertaking a behaviour, and the performance of the behaviour itself" **[13,14]**. Both the TRA and the TPB state that human behaviour is guided by two primary

considerations. 'Behavioural beliefs' refer to the individuals' beliefs about the likely outcome of a particular behaviour and their appraisal of these outcomes. These give rise to 'attitudes towards the behaviour', which will be either positive or negative depending on the individuals' appraisal of the possible outcomes. The second consideration, 'normative beliefs', is the belief that there is a set of 'normative expectations' placed on individuals by referent others and certain pressures to conform to these norms. These result in a 'subjective norm', which is the *perceived* pressure to perform (or not to perform) a given behaviour applied by salient groups or individuals. Further to this, the TPB includes an additional element, 'control beliefs', which is not part of the TRA. The product of control beliefs is perceived behavioural control. This pertains to a person's belief about the presence or absence of factors, which will antagonise or facilitate performance of the behaviour. A person may perceive that they have more control over performance of the behaviour if they believe they have adequate resources, skill-set and opportunities[15,16]. Intention to perform the behaviour is a function of these three constructs and is the immediate antecedent to performing the behavior. [17] The proportion of how much each of the three constructs contributes to intention varies with population and behaviour under investigation. Examination of the relative contribution of each predictor to the behaviour can help explain dynamics of the decision-making process. [17]

Figure 1 describes these determinants of behaviour and their subsequent aggregates.

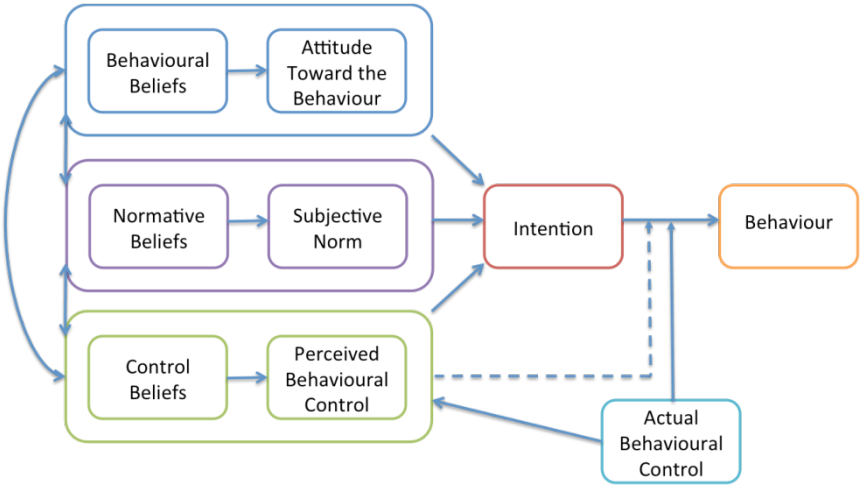


Figure 1: Representation of Azjen's Theory of Planned Behaviour

To be a useful instrument for explaining human behaviour, the TPB must be constructed into a questionnaire developed specifically for the behaviour of interest. The theoretical constructs cannot be directly observed nor measured. Thus, variables must be self-reported or inferred from observation. Important or recurring themes from each of the three constructs can then be incorporated into a questionnaire format.

2. ARTICLE ONE – ELICITATION STUDY

INTRODUCTION

Similarly to organics, local food has become a vehicle for a variety of health and environmental causes. Food of known provenance seems to mitigate, at least in part, the growing public uneasiness of an increasingly industrialized food system. Although contention exists, many believe that local food produces less greenhouse gas emissions than a conventional food system because it travels far fewer food miles. [18] Furthermore, it is argued that small scale and family farms are more likely to follow sustainable farming practices, such as minimal application of agro-chemicals, than their corporate counterparts. [18] Others assert that risks posed by food-related pathogens are minimized because local producers are less prone to creating pathogenic risks in their production practices and/or are monitored by their customers. [19,20] From a health perspective, local foods have been lauded for their role in improving access to fruits and vegetables in areas considered to be food desserts, particularly when used in conjunction with federal food assistance programs. [21] Local foods are reasoned to have a superior nutritional profile than conventional foods because they are picked at their ripest and, hence, most nutritious. [22] However, some have raised questions about the ability of local foods to accomplish any of these goals. [23]

Increasingly, nutrition professionals are recognising the importance of discussing

alternative food production practices as part of nutrition education programs [24,25] and interventions [7,26,27] that seek to improve overall diet quality. In particular, discussions about local food, which include food procured via farmers' markets (FMs), community supported agriculture (CSA) or grown at home or in a community garden (CGs), may help improve aspects of the diet which are farthest from current recommendations.[28] Reviews of the literature reveal that individuals who purchase and consume locally produced food are typically female, have a higher income and are 40 years of age or older.[7] However, it has also been noted that psychosocial variables may be more influential than demographics as predictors for purchasing locally produced foods. [29,30] For instance, Bisonette and Contento [30] found that 31% of the variance in intention to buy or consume local food could be explained by psychosocial variables, as compared to 24% of the variance in intention to buy or consume organic food. It is therefore essential to convey educational messages that appeal to specific beliefs and attitudes about local food as opposed to a particular demographic. Among the psychosocial theories used to explain behaviours related to food choice, the Theory of Planned Behaviour (TPB) has shown to be effective in predicting intention to consume certain foods (i.e. soy foods [31], ready-to-eat meals [32]). The TPB suggests that, although there is not a perfect relationship between behavioural intention and behaviour itself, intention can be used as a proximal measure of behaviour. Attitudes toward the behaviour, subjective norms and perceived behavioural control, each of which measures beliefs about the behaviour, regulate intentions; therefore, the current study seeks to identify commonly held beliefs of people consuming a local diet. Because of the growing interest among consumers and nutrition

educators regarding issues of local foods and the associated limited research evaluating consumer beliefs and perceptions, an elicitation study was designed to contribute to a growing body of knowledge addressing this topic and to gain a deeper understanding of the beliefs that contribute to the use of local foods. It was also undertaken in order to elicit salient beliefs from study subjects in order to design a survey instrument that will allow the application of the TPB to predict intention to consume local food.

METHODS

Study design

Qualitative focus groups were conducted with adults from the Bryan – College Station area of Texas. Focus group methodology was appropriate as it fostered discussion about participants' beliefs and experiences as they pertained to eating local food. [33] To participate, individuals had to self-identify as actively seeking local alternatives to chain grocery stores and fast-food restaurants. Specifically, they had to procure food directly from the farm, at a farmers' market (FM), through Community Supported Agriculture (CSA) or grow it themselves at a community garden (CG) or in their home garden. Participants were recruited via emails sent on behalf of the researchers to people belonging to a local CSA and locavore group. Locavores are individuals who purposely seek out and consume local foods. The Texas A&M University Institutional Review Board approved this study and informed consent was obtained from the study

participants. Participants were offered refreshments but were otherwise not compensated for their time (around 2 hours).

Focus group discussions and data analysis

The primary investigator facilitated 3 focus group discussions, which were all approximately 120 minutes in length and were audio recorded. A second facilitator was present and was responsible for taking notes in the event that audio was ambiguous or inaudible. The Theory of Planned Behaviour (TPB) was used as a theoretical framework within which to base focus group questions. The TPB is a socio-psychological theory that is widely used in nutrition and other health-related sciences to explain behaviour over which the individual has volitional control. It is part of a class of models, which are characterised by rational choice. [10] Focus groups began with an overview of the format of the session and the assurance that there were no right or wrong answers to questions. After completing the consent forms, participants were asked to introduce themselves to one another and to discuss their journey towards eating locally. Focus group sessions began with the following question to help stimulate conversation: "How do you define local?" Further questions were designed to identify specific behavioural, normative and control beliefs related to consuming a local diet. For example, "What do you perceive to be the benefits of eating locally?" (Behavioural beliefs); "Who is important to you when you make decisions about buying local food?" (Normative Beliefs) and " What makes it difficult for you to eat locally" (Control beliefs). Eleven adults (4 males, 7 females)

participated in 3 focus groups, which were held in a community-based meeting space. The small n may not be considered rigorous enough to achieve data saturation, however, no new themes were identified during the second and third focus groups that were not covered in the first indicating that data saturation was achieved. In addition, Ajzen does not specify a number of participants required to elicit salient beliefs. Rather he states, "A small sample of individuals representative of the research population is used to elicit readily accessible behavioral outcomes, normative referents, and control factors". [30]

All participants were Caucasian and all groups were of mixed gender. Focus group audio was transcribed verbatim and major themes and subthemes were identified and agreed upon by both authors. Themes were listed in order from the most frequently mentioned to the least frequently mentioned. The most commonly occurring themes are presented below.

RESULTS

Behavioural beliefs

Focus group discussions revealed that the most prevalent behavioural beliefs surrounding local food consumption are beliefs about health and nutrition, dietary variety, taste, community and the environment. In terms of normative beliefs, significant others, immediate family and peer groups were considered to be referent others who may influence behaviour. Cost and access were considered to be barriers to eating local food.

In addition to the established TPB variables two additional components, moral obligation and trust are discussed here as potential new variables.

Health and Nutrition. A large majority of participants believed that eating local food resulted in better health and nutrition. This was particularly important for participants who were older in age and who were afflicted with issues of ill health or who were concerned with becoming ill. One participant whose wife suffers from multiple sclerosis commented, "I think the older you get, health issues dictate, in some respect, a change in eating habits to help you get through life a little easier. It's helped my wife's MS to eat better, local foods and not processed foods." When asked why they believed that local food was better for their health one participant responded that "one thing that happens when you try to eat more locally is that you just automatically eat less meat." Further to this, she adds "you have to prepare everything from scratch and it's less processed, you don't have extra chemicals and extra sugar and salt, you can control these things." Another participant agrees that local food is healthier due to its unadulterated nature: "And you don't have to do a lot to it to enjoy eating it, you don't have to drown it in salt or in gravy or a salad dressing, you can just eat it pretty simply." Others believe that local food is more nutritious because it is fresher than the store-bought counterpart and has therefore retained more of its nutrients. A female participant who was asked if she believes that local food is more nutritious answered "I think I would say absolutely, even if for the very sole reason that you would say you are eating it sooner than you would if it was shipped from somewhere else." To which a male respondent commented

"Isn't that what they say about tomatoes? It loses like 80% of its vitamins." There is also a widely held belief that local food is more nutritious to begin with than the alternative. For example, one older gentleman commented, "Farm fresh eggs have about 60% less cholesterol than store bought eggs."

Taste. The most prevalent belief about locally sourced food was that this food tasted better and is more flavourful than the grocery store bought counterpart. This was owed in large part to the belief that food was fresher than the grocery store alternative. One participant had heard that her local Wal-Mart was reducing the cost of produce and decided to see how they compared to ones she buys at the FM. "I had grape tomatoes, they were absolutely tasteless, I didn't know where they came from but they had no taste whatsoever, it was like chewing on fibre, it was just miserable." This sentiment resonated among other participants who commented on the lack of flavour of conventional produce in contrast to local food, which they could prepare simply without adding salt or salad dressings, and still retain the flavour. One participant quipped that "you can pop the cherry tomatoes like candy," demonstrating how sweet and juicy she finds local tomatoes. When asked what her reasons for eating locally were, one participant responded by saying "…For environmental reasons, for health reasons, but really selfishly for taste reasons." This sentiment was echoed by a number of other participants who self-identified as being 'foodies'. For instance, one participant said: "I'm such a big foodie… it just tastes better when it's in season and it's not being

transported." Food and cooking were central to all discussions with participants frequently sharing resources and recipes for local food.

Environment. Beliefs about the environment were central to participants' decision to eat locally, particularly among younger participants. A female graduate student articulates her beliefs about local food and the environment; "my reasons for eating local are environmental. I'm really about the environment and that's why I'm not eating meat and that's why I don't want to use chemicals and pesticides and also the transportation cost of non-local foods. I'm not going to be buying avocadoes from Chile and eating it. I just can't justify that for myself." In addition to transport costs, participants believed that local farmers were more likely to adopt 'environmentally friendly' practices, such as restricting the amount of pesticides and herbicides they use on their crops.

Dietary Variety. Some contention existed among participants when it came to the topic of dietary variety, with most people stating that they have to sacrifice variety in their diet in order to eat locally. One female respondent said, "that's a difficult aspect of this for me, is to give up variety and you know, only eat cabbage all winter long." A female participant who had just recently moved to Texas from California also felt restricted by the local offerings saying, "Here the challenge is with the limited variety." Her partner agreed: "Yeah, it's mainly just the same thing over and over again." Another participant explained how she believed that her local diet still contained a lot of variety but that the variety she got in her CSA box was different from the variety she got in the grocery store

and how she has had to make peace with the adjustment: “we get stuck in that rut of carrots, tomatoes, broccoli, cucumbers, and so like right now, we have a *lot* of variety. It’s just not the variety we’re used to… Right now, it’s cabbage, it’s brussel sprouts, it’s beets, it’s rutabaga, it’s parsnips, it’s kohlrabi, and it’s greens. It’s been a lot of variety but it’s being willing to give up what our old variety was.” When asked if she believed she had more variety in her local diet a female participant said, “much more variety, my kids have much more variety than I ever did as a kid. And as an adult I’m very happy, I don’t buy canned vegetables. I’m learning to put up [can] and freeze what we don’t eat” A female from the baby-boomer generation commented that she believes that she has more variety in her diet as a result of trying a number of new things through her CSA that she had never eaten before. She joked, “ I had never cooked a fresh beet, but I had to ask somebody because I ate the first one raw and that gives you an unexpected surprise!”

Community. One of the perceived benefits of eating locally was the sense of belonging to a community. One male respondent explained what these benefits entailed for him: “Knowing the people at the local FM, especially this one. They’re friendly and you can just talk to them about anything.” Another female participant described a discussion she’d had while volunteering at the FM: “I was talking to a volunteer at the FM and I asked her what percent of her diet was local and she said really small and I was stunned and I asked her ‘what brings you out here?’ and she said, ‘the community aspect.' But it’s not about her diet and it’s not about nutrition.”

Normative beliefs

Significant Others. Out of the eleven participants, there were three couples. A male participant explained that his wife's dedication is motivating him to eat more locally sourced foods. He said, "The huge influence is obviously my wife, she's a whole lot further along than I am but I am progressing along the process of eating more locally." Further to this, three more participants said that their significant other influenced their decision to eat locally. When asked if her family influenced her decision to eat locally one participant responded, "[my husband] is probably more of a push to help me try to keep things local," stating that she will sometimes buy things from the grocery store that are not local.

Children and Family. Several participants with children mentioned that it was important to them that their families eat locally; "At least I feel like my kids are getting a better deal, and my husband and I, I hope, are healthier because we're eating better." It is also important to this participant her that her children know where their food comes from and that they are aware that foods are seasonal. Another male participant who was considering the family he and his wife would have in the future said, "it's important for me that my wife eats well and I eat well and someday when we have kids that they will eat local." A participant with a young daughter talked of the importance of feeding her local food; "I feel better about putting that food into my body, and giving it to [my

daughter], because where my body has built up a resistance to different things, she doesn't have yet, so giving her that food is important to me."

Peer Groups. Discussion of peer groups revealed that oftentimes, participants felt negative social pressure from peers who didn't share their values for eating locally. A participant who works as a nurse commented that her nurse friends refused to eat at local café with her and would make comments such as, "I'm not going to eat an eggplant sandwich." The participant who had recently moved from California discussed the differences in attitudes towards local eating among his friends from home and his new friends in Texas; "they'd be more responsive to it, they'd be like 'Oh this is cool,' but people here are like 'Why would I want to do that? That sounds hard and I don't want to eat like that.'" When asked if she had felt any negative pressure from her friends, a retired lecturer and artist replied, "Oh yes, all of my fat friends. When I started doing that I suffered a lot from friends who said, 'You are absolutely crazy, are you insane?'" However, one friend who also eats local foods is a positive influence of whom she says, "We support each other."

Control beliefs

Access. Lack of access to local foods was perceived as an obstacle to local eating by a number of participants. In particular, participants found it difficult to attend the FM given the limited window during which they can shop there on a Saturday morning. This

is often confounded further by other Saturday morning activities or work commitments. One participant complained, “They’re just not available enough. Saturday morning is the only period of time I have and then it’s only for 45 minutes and I have to rush up there and get off to my commitment on Saturday.” Furthermore, participants were frustrated by the fact that local food was rarely available in grocery stores so they could not stock up on local food midweek, for example. However, participants who were members of the CSA didn’t perceive access to be as much of a barrier to local eating as their CSA box is delivered to their homes once a week. The participant with two young sons commented, “I actually find it more convenient,” as compared to the grocery store. When asked what enables them to eat locally, the couple from California commented, “The CSA is [a] huge [factor].”

Cost. There were again mixed beliefs about the cost of local foods and the perception of cost as a barrier. The mother of two sons explains that the additional cost of local food is worth it to her “You can get food really cheap at the grocery store whereas at the FM I’m paying $3/head for hydroponic lettuce, and it’s beautiful and it lasts for 2 weeks and we love the way it tastes but it’s $3. When at the grocery store its 69¢ for a head of lettuce. So it’s more expensive, but my kids eat it, to me it’s worth the cost, if you’re balancing that, but it’s definitely not cheap.” The mother with the young daughter shares a similar belief, “My perception of cost is, I think if someone makes a decision to do this as a lifestyle, they have decided that they’re willing to spend more money on food.” One couple commented that they have not recommitted to the CSA because of the upfront

cost of it and another couple state that they have had to find savings elsewhere to cover the cost of local foods. Both of these couples have stopped their cable subscriptions to help them afford local food. At the other end of the spectrum, the woman who had recently moved from California comment on how inexpensive local eating is for her "When I would be shopping just for myself at the Davis FM, I'd spend $40/week just at the FM, it's expensive but here you could buy more than you ever want to eat for $20 at the FM."

Trust

A commonly occurring theme in focus group discussions was that of trust and mistrust. More specifically there was an apparent distrust of large food producers and an inherent trust of small/family farms and farmers. One female participant explained why she feels as though she can trust her local farmer, "If you lie to your customers and they're local you'll go out of business." A retired gentleman commented, "I think if you go to any FM that's truly a FM, you know without having to questioning them too much that you're getting what they say you're getting, you know after our age group, buying in grocery stores, what you're getting at the FM is raised by that guy." Another woman adds, "As my friends says 'Well they could lie to you'. Well they could, but I just have a feeling that they don't… I trust them more than I trust HEB [a Texas grocery chain] to be honest." When probed as to whether or not she trusts large-scale food producers another participant commented, "Yeah I don't trust them, I don't trust hardly anybody. That's

why I like to know *who* is growing the food." When asked what his impressions of Wal-Mart selling local food were, one participant told of how he was wary of their agenda, "They're touching on something that's stirring up in the conscience of folks but sort of offering an artificial solution. Maybe that's my paranoia and mistrust of corporations."

Moral obligations

When asked if they believed that they had a moral obligation to eat locally, participants generally indicated that they believed it was a moral issue but not a moral obligation. As one participant said "it goes with my values and my interests and choices but to me it's not the same as a moral obligation." Another participant explained this further by saying "I wouldn't say obligation, I would say it was a moral issue because if everybody ate locally, think what that would do to our reduction of fossil fuel dependence or the cost of getting the food here, and the money would stay locally." For some, a moral obligation was tied up with religion and they therefore did not perceive eating locally to constitute a moral obligation. Others, however, were of the opinion that eating locally was in fact a moral obligation for them "For something to be morally significant it needs to affect just not you and food can be about just you and about your own personal desires and pleasure and fulfilling those, but to eat locally, to eat sustainably, to eat organically, encompassing all of those things. You are saying that you value something that's not just you, it becomes a moral thing it becomes this obligation, with lots of different things outside yourself."

DISCUSSION

This work provides numerous insights into the behavioural, normative and control beliefs associated with eating locally. Previous research has focused on the beliefs and attitudes of the general population as they pertain to buying and consuming local foods. The current research has identified beliefs and attitudes as they relate to individuals whose diet is primarily composed of local foods. In addition, research in this area is limited and finite and therefore comparisons will be drawn from the literature on related food choice studies, namely organics. Organic food is distinctly different from local food in the minds of consumers [34] however, behaviour related to purchase of organic food significantly increases the probability of buying local food. [29] There are overlapping beliefs between the two groups and it might therefore be useful to compare finding of this study with that of studies on organic food. Interestingly, a large majority of participants believed that eating locally was healthier and/or more nutritious, a finding, which alone warrants further research. This belief was especially strong in participants of an older generation who were presumably more concerned with health, however, younger participants also believed that local food was more nutritious and that local diets were healthier overall.

Behavioural beliefs

Health and Nutrition. Previous research on adolescents who supported alternative food production practices (organic, non-processed local, non-GMO) has shown that adolescents who identify with ≥2 alternate food practices are more likely than their peers to achieve the Healthy People 2010 guidelines and are more likely to avoid fast food.[24] Furthermore, this study found that supporters were significantly ($P < .001$) more likely to meet the guidelines for lower total and saturated fat consumption, greater fruit and vegetable consumption and greater adherence to 5 or more daily serving of fruits and vegetables. [24] Interestingly this group also reported being significantly ($P < .001$) more interested in healthy food and health overall.[24] Therefore this result is consistent with the findings of the current study whereby a large majority of participants described health as being paramount in their decision to eat locally. In addition a study of Swedish adults, which also used the theory of planned behaviour as the theoretical framework, found that concern for one's own or family health was the strongest predictor of attitudes towards, and purchase intention of selected organic food. [35] Furthermore, health was an important predictor of purchase frequency of organic products. [35] In contrast, Zepeda and Li [29] found that attitudes towards nutrition and health had no significant effect on the probability of buying local. However, their study surveyed the general population as opposed to people whose diet is primarily composed of local foods and so this might explain some of the differences in beliefs about local food.

Taste. Local food advocates, such as Alice Water often discuss taste as being one of the biggest virtues of local food and this sentiment resonated among participants of this study and has been shown elsewhere too. In a survey of 500 north easterners, Wilkins *et al*., found that people perceived local fruits and vegetables to be fresher, look better, and taste better than those imported from other regions or countries. [36] In the current study, perceived taste and freshness were important considerations for people when deciding to eat locally. Furthermore, a study conducted in France of people participating in a CSA scheme found that quality (i.e. taste and freshness) of the produce was a primary motivator for subscription. [37] Also of note, Chambers *et al.,* [34] reported that women were more inclined than men to say that local food was fresher and tastier than imported foods. Although no differences were detected between men and women in this study, a larger sample size would be required to validate this.

Environment. The belief that eating locally would reduce their environmental burden was salient among participants. This finding is reinforced by the existing literature on this topic, which demonstrates the link between environmental concern and food choice. For instance, Lea and Worsley [38] found that eating locally was one of the most commonly performed environmentally friendly food-related behaviours among the general population. Eating locally was perceived to have more of a positive environmental impact than choosing organically produced foods or reducing meat consumption. [38]

Variety. A perceived drawback of local eating was having to sacrifice variety. A study conducted to determine the barriers to eating locally found that participants enjoyed the year-round choice of imported foods and were unwilling to forfeit variety. [34] However, others in this study were of the belief that they had incorporated more variety into their diet as a result of choosing local foods. An objective indicator of dietary quality and variety, such as the Healthy Eating Index, could be calculated for local diets to determine if variety is truly compromised.

Normative beliefs

Significant Others. This study found that participants' believed that their significant others (partner/spouse) may exert a social pressure or provide social support which resulted in perpetuating the behaviour of eating locally. Interestingly, a national survey of food shoppers found that, among demographic variables, only presence of >1 adult in the household was significantly associated with probability of buying local food. [29] The authors suggest that this may be explained by having someone to share and appreciate the meal with, however, it could also indicate that local food buying behaviours are influenced by a referent other. With regards to the psychosocial determinants of behaviour, previous research has noted the importance of referent others on food choice. For instance, a study of 400 women in Texas found that husbands and boyfriends strongly affected their intention to avoid eating beef. [39]

Peer Groups. A worksite intervention, which employed a farm-to-work type programme, found that those who perceived co-workers or management as being 'very satisfied' with their local food order bought more local produce outside the worksite after the intervention. Furthermore, workers were more likely to have participated in the programme if most of their friends also participated. [7] This finding indicated that peer groups may exert a positive social pressure towards eating locally. In contrast, the findings of the current study suggest that peers are typically not supportive of local eating behaviour. This can be partially explained by the area's deep-rooted connection to agribusiness; the resultant culture and mentality of which is not conducive to supporting local foodsheds.

Contol beliefs

Access. In the worksite farm-to-work programme study [7] mentioned previously, it was noted that those who participated did so in order to overcome barriers to purchasing locally grown produce outside of the workplace. A major barrier to eating locally is the limited hours of operation of many FMs. In this study, participants were commonly frustrated by the small window of time, in which they had to shop at the FM, and because local foods were not available in the grocery store. This effect was negated, at least in part, by subscription to a CSA in which produce was delivered directly to the customer's home and therefore considered more convenient than having to shop at the grocery store.

Cost. A study of FMs in Philadelphia estimated that 53% were located in middle-high income areas, compared to only 29% in areas with a household income < $30,000. [40] The study also noted that a number of the FMs in low-income areas were supported by food justice organisations.[40] The clustering of FMs in affluent areas suggests that local foods are not affordable for everyone. The findings by Kramer and DeLiberty reinforce the results of this study whereby participants perceived cost to be a barrier to buying local food. The perception of local foods as being more expensive has been found elsewhere [34] but it is interesting to note that their work found no difference in attitudes based on socioeconomic status. Also, although participants in this study perceived that the cost of local food was more, they believed that the other benefits of eating locally (better nutrition, taste etc…) outweighed the financial costs. Studies measuring the cost of a 'local food basket' as compared to a 'conventional food basket' are required.

Trust and Distrust. As noted elsewhere [41] , people who frequent a FM have an inherent trust of the farmers who produce their food, stating that they believe that farmers are honest by virtue of the fact that they are local people and as such, would not lie to other local people. It appears as though this trust stems from the ability to have meaningful social exchange with the farmer, as opposed to a large corporation where the producers of the food remain faceless. In the current study, many people were dubious of the integrity of large corporations, and as such were less likely to trust the honesty of their products, as for instance, when a product claims to be 'all natural' or 'hormone free'. In

contrast, people were far more willing to believe a local farmer who made such claims, without asking many questions about production methods, or visiting the farm to verify for him or herself. Saba and Messina [42] have noted that there is widespread anxiety about the food we eat. They state that factors such as an increase in the frequency of food scares and consumer distrust in the regulation of the food supply have contributed to this anxiety and as a result people are seeking alternatives to commercially produced food. They explore the use of organic food as a means of managing this anxiety and it would be reasonable to suggest that those participating in the local food movement are behaving similarly.

Moral Obligation. Others have demonstrated the link between food consumptions and morality as in the context of fast food [43] and raw milk [20], for example. Similarly to the way that fast food is judged as being a poor eating choice and is often associated with obesity and even immorality [43], it could be argued that local food is the antithesis, conjuring up notions of healthy living and concern for ones own health as well as the health of the environment and the local community. Therefore, eating locally can be considered to be a moral behaviour that people use to convey a positive image of themselves, demonstrating their awareness of the difference between ‘good’ and ‘bad’ food choices. [20]

Limitations

This study provides insight into the behavioural, control and normative beliefs associated with individuals who actively seek local alternatives to supermarket chains and the globalised food system. However, this sample may not be representative of a national sample of locavores. In addition, participants' responses may be subject to bias in a group setting but focus groups can facilitate a discussion, which might not result in a structured interview. Therefore, despite the limitations, focus groups methodology is appropriate for the collection of formative data.

Implications for future research

This qualitative research helps to understand the food-related beliefs held by people consuming a locally sourced diet. These findings will be used as the basis for a quantitative study to measure the contribution of each of the TPB constructs towards consuming a local diet, as well as measuring the contribution of new variables speculated to be important, such as trust and morality. Furthermore, the findings from this elicitation study may be used to inform nutrition educators interested in promoting local foods and diets. In particular, it could be useful in increasing participation in federally funded nutrition assistance programs, such as the Farmers' Market Nutrition program or the Senior Farmers' Market program. [21]

3. ARTICLE TWO – INTENTION TO CONSUME A LOCAL DIET RELATED TO PERCEIVED BEHAVIOURAL CONTROL AND MORAL OBLIGATIONS

INTRODUCTION

In 2011 the US Department of Agriculture (USDA) reported a 17% increase in the number of Farmers' Markets (FM) across the country, bringing the total number of FMs to 7,175. [3] This increase is indicative of the growing trend in local food purchase and consumption among consumers. Local foods are perceived as being of higher quality, fresher and better for the environment. [34,36,37] Accumulating evidence suggests that local foods may help improve access to, and increase consumption of fruits and vegetables. [21,44,45] As less than a quarter of Americans meet their daily fruit and vegetable intake recommendations, [46] nutrition professionals are beginning to incorporate messages about local food into nutrition education materials and interventions. [26,27,44,45,47] The general consensus in the literature is that individuals who purchase and consume locally produced food are typically female, have a higher income and are 40 years of age or older. [7,37] However, recent work has suggested that characterising local food consumers based on demographics alone is incomplete and that psychosocial determinants of behaviour may be more robust predictors for local food consumption. [8,29,48] Therefore, having an understanding of the psychosocial factors taken under consideration by consumers is valuable for nutrition professionals designing interventions and can help focus nutrition education materials. The Theory of Planned Behaviour (TPB) is a

psychosocial model, widely adopted in the health and nutrition literature, that has shown to be effective in predicting intention to consume more of certain foods in the future (i.e. soy foods [49], ready-to-eat meals [32]), as well as predicting senior's intention to purchase fruits and vegetables via FMs in the future. [50] The TPB reasons that behaviour is directly influenced by intentions. If an individual has a strong intention to perform a given behaviour then they are more likely to execute the behaviour. According to the TPB, there are three primary constructs that influence intention: Attitude, Subjective Norms (SN), and Perceived Behavioural Control (PBC). [16] Attitude refers to the beliefs the individual holds in regard to performing the behaviour, which can either be positive or negative. SN refers to the perceived social pressure regarding the behaviour, and finally, PBC is one's perceived capacity to perform the behaviour. According to Ajzen, if attitude, SN and PBC are strong, intention will also be strong and this will in turn lead to performance of the behaviour. [16] The TPB is also amenable to the inclusion of additional predictors of intention if they explain a significant amount of variation after the model's current variables have been considered. [17] This study seeks to identify the variables that influence intention to consume a local diet using the TPB and introduce the concepts of trust and moral obligation with regards to local food consumption. Furthermore, the importance of habit in predicting human behaviour is considered by examining the influence of current behavior in the model.

METHODS

Pilot testing

Following Ajzen [15] an elicitation study was conducted to determine salient beliefs held by local food consumers. Questions were developed using the Theory of Planned Behaviour (TPB) as the Theoretical Framework and included questions such as "What do you perceive to be the benefits of eating locally?" and "What makes it difficult for you to eat locally?" A draft questionnaire was then developed based on these findings. Cognitive testing was performed with draft versions of the questionnaire by the primary author. Respondents typical of the population of interest (both local food and non-local food consumers) were interviewed (n=25) for their understanding of the questions and their thought process as they answered. After revisions had been made to the questionnaire, it was pretested on a class of undergraduate Nutrition majors (n=35). Internal consistency reliability was calculated for both direct and indirect measures. Indirect measures: attitude, α=0.52, subjective norm α=0.53, perceived behavioural control α=0.12 and trust α = 0.98. Direct measures: attitude, α=0.89, subjective norm α=0.93, perceived behavioural control α=0.93. Internal consistency was expected to be higher for a larger n, particularly in the case of perceived behavioural control. There were no obvious patterns in the data that indicated particular items led to lower alphas.

Participants

Participants were recruited in the Austin, TX area where there is a large and well-established local food movement. Participants (n= 186) were recruited from a variety of places; around 45 people were recruited from a coffee shop and a further 50 were recruited while shopping at a Farmers' Market. The remaining participants were recruited via 3 different food-related email groups (including a Community Supported Agriculture scheme's online newsletter). The online approach was adopted when an insufficient number of participants enrolled in person. Participants had a mean age of 36 years (SD= 12.1 years) and a mean body mass index (BMI) of 23.8 (SD=4.6). Additionally, 75.2% were female. Participants were primarily Caucasian (84%) and 83.1% had either a college degree or an advanced degree.

Procedure

Ethical Approval was obtained from the Institutional Review Board of Texas A&M University. In-person recruitment involved a verbal explanation of the study requirements followed by the participants reading and signing the consent form. Contact information, including telephone number, email and home address were also collected at this point. After obtaining informed written consent, participants were given a TPB questionnaire and return envelope and asked to return the questionnaire at their earliest convenience. Those who were recruited via email were asked to read the consent form

before emailing their contact information. Once contact information had been received, two copies of the consent form and a copy of the questionnaire were posted to the participant. The participant was asked to return the questionnaire and a signed copy of the consent form at their earliest convenience.

Measures

Demographics. These were self-reported and consisted of age, sex, height, weight, race/ethnicity, education, marital status and household income.

Current Behaviour. Participants also reported their average weekly household food bill and what percentage of their diet was composed of local foods (0%, 1-19%, 20-39%, 40-59%, 60-79%, 80-100%).

Attitude. This was measured using both direct and indirect measures. Direct measures of attitude involve the use of bipolar adjectives that evaluate the behaviour following a single 'stem' question: 'For me, eating local food is'. In this instance there was one instrumental item (worthless-useful) and three experiential items (harmful-beneficial, good-bad, pleasant-unpleasant). Each was measured on a 7-point scale, which ranged from 1 (negative endpoint) to 7 (positive endpoint). Indirect measures of attitude are assessed using two measures. First of all, participants are asked to indicate how strongly they agree or disagree that performing a given behaviour will result in a particular

outcome (behavioural belief). Secondly, they are asked evaluate that particular belief by indicating how desirable or otherwise that outcome would be for the individual (outcome evaluations). For instance, participants were asked to indicate how strongly they agreed or disagreed with the statement 'Local food is better for my health than conventional, store-bought food'. They were then asked to indicate how desirable or undesirable it was for them to 'do something positive for my health'. The behavioural belief score is then multiplied with the outcome evaluation score. The resultant products are then summed across all beliefs to give and overall attitude score. Behavioural beliefs were measured using a 7-point unipolar scale (1-strongly disagree, 7-strongly agree). Outcome evaluations were measured using a 7-point bipolar scale (-3- extremely undesirable, +3 – extremely desirable). Other items measured included attitudes about health/nutrition, taste and environment.

Subjective Norms. Direct measures were assessed using two items that evaluate the individual's perceived social pressure to eat local food. The first item measures how strongly people perceived that referent others cared whether or not they eat local foods and the second measures the perceived expectations referent others have with regard to the individual eating local food. Both of these items were measured using a 7-point unipolar scale. Similarly to attitudes, subjective norms were measured using an expectancy-value model. In this case, normative beliefs were measured on a 7-point unipolar scale (1-not at all, 7-very much so) and motivation to comply was measured using a 7-point bipolar scale (-3 – not at all important, +3 – very important). Normative

beliefs and motivation to comply were multiplied together and summed across beliefs to give an overall subjective norm score.

Perceived Behavioural Control. Again, both direct and indirect measures were used to asses this variable. Direct measures were assessed using four items; two items measured self-efficacy and two items measured controllability. All four items were measured on a 7-point unipolar scale. Control beliefs (measured on a 7-point unipolar scale) were multiplied with influence of control beliefs (measured on a 7-point bipolar scale) and summed across beliefs as an indirect measure of PBC.

Moral Obligations (MO). These were measured using six items on a 7-point unipolar scale, ranging from strongly disagree to strongly agree. All six items used the same stem statement; 'I should buy local food because' and concluded with a variety of items ranging from health and environment to supporting local farmers.

Trust: Trust in local farmers was measured by multiplying trust beliefs (measured on a 7-point unipolar scale) by trust evaluations (measured on a 7-point bipolar scale). These were then summed across two trust beliefs to give an overall score for trust. Participants were asked if they trusted their local farmer more or less than a) a chain grocery store and b) a large food producer. They were subsequently asked how important it was to be able to trust their local farmer.

Intention: This was assessed using the Generalised Intention method, which consists of three items that measure what percentage of the diet an individual *wants, intends* and *expects* to be made up of local food. Intention was measured on the same 6-point scale (0%, 1-19%, 20-39%, 40-59%, 60-79%, 80-100%) as was current behaviour. Each category was converted to a numerical value (1-6) and the mean score across the three items was calculated to give an overall intention score.

Analytical strategy

All analyses were conducted using SAS Enterprise (version 4.3, SAS Institute, Inc., Cary, NC, 2010). An α level of .05 was used to determine statistical significance for all comparisons. The indirect measures of TPB variables (attitude, SN, PBC and trust) were created by multiplying together expectancy statements with their corresponding value statements. The TPB variables were subject to principal components analysis (PCA) with varimax rotation. The number of factors retained was determined by application of the minimum Eigenvalue of one criterion and assessment of the interpretability of the resulting factors. Factors were identified by the items that loaded high on a given factor; >.500 was considered high. PCA was also performed on the direct measures. In each case, the factors that were created became new variables for use in multiple linear regression and path analysis. Multiple regression is the most frequently used technique to test TPB-based models; however the present analysis takes this one step further, given the interrelationships among the various components of the TPB model (see Sun [51],

McIntosh [52]). This work suggests, that moral obligations may influence both behavioural beliefs and attitudes. In addition, it is not unreasonable to expect that elements of the TPB model that influence current behaviour will influence intentions indirectly through current behaviour, given the effect of current behaviour on future intentions. Dashed lines in the path diagram represent hypothesised relationships that were not significant.

RESULTS

A total of 114 TPB surveys were returned giving a response rate of 61.3%. Participants were prompted by email to return their questionnaires; on average, participants received 3-4 email reminders to return their questionnaire if they had not already done so. Because of the relatively low number of participants indicating that they had a significant other (n= 87), this item was dropped from the indirect measure of SN variable, leaving peers and family members in the variable. The mean score for the three intention items was used to allocate participants to one of five 'intention groups'. The mean scores for each of the TPB variables (both direct and indirect measures) prior to PCA are presented below (Table 1) based on intention group. Variables tend to trend upwards, indicating that those who have intentions towards eating more local food also have stronger attitudes, SN and PBC over the behaviour, as well as stronger MO towards eating local and more trust in local farmers.

Table 1. Comparison of ratings between each category of intention to consume local food in the next 6 months (mean [SD])

	0-20% n=11	21-40% n=27	41-60% n=31	61-80% n=35	81-100% n=9
TPB Component					
Direct Measures					
Attitude †	6.1 [0.8]	6.7 [0.4]	6.6 [0.6]	6.8 [0.4]	6.9 [0.3]
Subjective Norms †	2.9 [0.4]	3.2 [1.1]	3.7 [1.7]	3.7 [1.6]	5.3 [1.1]
PBC †	4.5 [1.1]	4.9 [1.2]	5.4 [1.1]	6.1 [0.9]	6.7 [0.4]
Moral Obligations †	5.1 [1.1]	5.8 [0.8]	5.9 [0.8]	6.6 [0.6]	6.6 [0.6]
Indirect					
Attitude ‡	9.5 [5.6]	13.8[3.9]	14.4 [4.4]	16.9[4.4]	18.9[1.9]
Subjective Norms ‡	1.5[6.1]	2.5 [6.0]	1.6 [5.9]	2.0 [5.7]	3.1 [9.1]
PBC ‡	-6.6 [7.2]	-4.6 [5.5]	0.4 [5.0]	1.4 [6.3]	3.8 [5.2]
Trust ‡	10 [5.6]	14.6 [6.5]	14.9 [6.5]	17.5 [5.1]	17.8 [5.8]

† Scores are from +1 to +7.

‡ Scores are from -21 to +21.

Principle components analysis

In the case of the direct variables, MO produced two distinct factors. The items that loaded onto the first factor, henceforth referred to as Moral Obligations 1 (MO1), were regarding helping local farmers, using less fossil fuels and creating less pollution. The items that loaded onto the second factor (Moral Obligations 2, MO2) were regarding personal and family health, as well as the health of the land. All items loaded high on their respective factors. 55% of the variance in the items was explained by the first factor

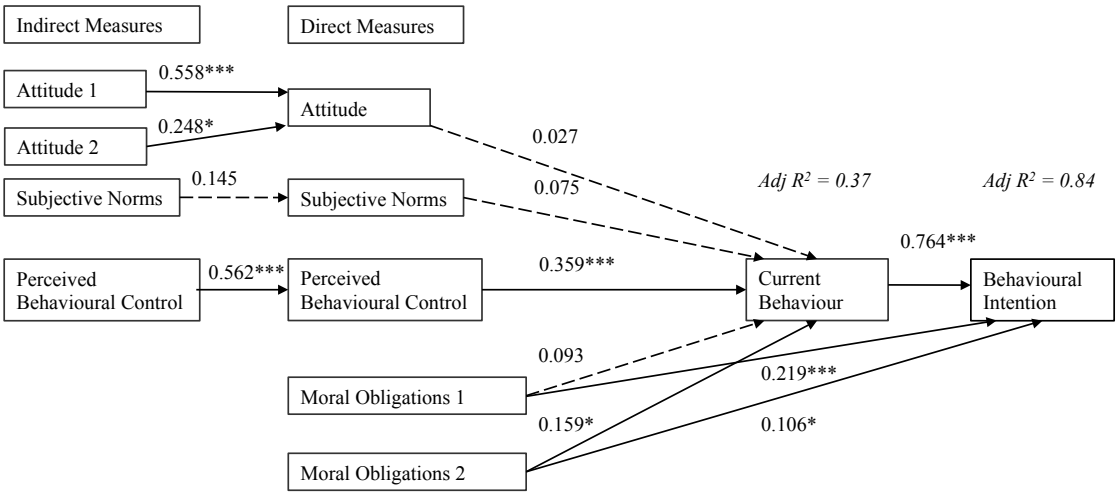
(MO1) and 26% was explained by the second factor (MO2). In terms of the indirect variables, attitude also produced two factors. Items that loaded on the first factor include: health, nutrition, taste, environment and food safety. This factor explained 56% of the variance in the items. Items that loaded onto the second factor include: community, fossil fuel dependency, social justice and food security and this factor explained only 9% of the variance in items.

Path analysis for intention to consume local food

Figure 1 shows a path diagram representing the results of several multiple regression and Pearson's correlation analyses, providing empirical evidence for the use of the TPB regarding local food consumption. For attitude, direct effects were calculated based on a regression model using the direct measure of attitude as the dependent variable and the two indirect factors as the independent variables. The adjusted R^2 for this model was 0.32. Pearson's correlation coefficients between the direct and indirect measures of SN and PBC were 0.19 and 0.56 respectively. These values were also used to calculate direct effects.

The next model involves using current behaviour as the dependent variable, with the independent variables: Attitude, SN, PBC and MO1 and MO2. SN was positively related to current behaviour as was PBC and MO2. The adjusted R^2 for this model was 0.37. The second model involves intentions (future behaviour) as the dependent variable and

current behaviour now serving as an independent variable in addition to the same five independent variables as in model 1. In this model, PBC, MO1 & MO2, and current behaviour were positively related to intentions. . As depicted in figure 1, intention was a good predictor of behaviour ($R^2 = 0.84$). Path Analysis revealed that PBC and moral obligations 2 had an indirect effect on intention to eat local foods (see Table 2). In addition, both MO1 and MO2 had a direct effect on intention to eat local foods. Therefore, intentions to eat more local food were associated with having control over eating locally and feeling a moral obligation to consume local foods. Neither of the attitude factors produced from indirect measures were significant in the model.



Note. * P <0.05, ** P < 0.005, ***P< 0.001; R^2 = Variance Explained

Figure 2. Path Analysis Of Intention To Consume A Local Diet Using The Theory Of Planned Behaviour (Showing Beta Coefficients)

Table 2. Direct, Indirect and Total Effects on Intention in Path Analysis.

Variable	Total Effect	Direct Effect	Indirect Effect
Indirect Measures			
Attitude 1	0.027	0	0.027
Attitude 2	0.012	0	0.012
Subjective Norms	0.003	0	0.003
PBC	0.257***	0	0.257***
Direct Measures			
Attitude	0.044	0.017	0.027
Subjective Norms	0.019	-0.057	0.075
PBC	0.426***	0.066	0.359***
Obligations 1	0.311***	0.219***	0.093
Obligations2	0.266**	0.106*	0.159*

Note. * $P < 0.05$, ** $P < 0.005$, ***$P < 0.001$

DISCUSSION

This work provides numerous insights into the behavioural, normative and control beliefs associated with eating locally. To date, no other work uses the Theory of Planned Behaviour to explore intention to consume local foods in a general population and also addresses the relationship between moral obligations and local food consumption. This work contributes to the literature on local food purchasing intention and therefore may

be useful for nutrition professionals who would like to include a local food component in an intervention program. Similarly, it could serve to assist in the design of nutrition education materials for supplemental nutrition programmes such as the Senior Farmers' Market Nutrition Program or the Special Supplemental Nutrition Program for Women, Infants and Children (WIC) Farmers' Market Nutrition Program.

Current behaviour

In this study, current behaviour has the largest effect on intention to consume local food. Behaviours that are performed frequently and/or repeatedly are believed to be driven by habit rather than intentions. [53] Although not a perfect measure, current behavior could be considered a proxy for habit, suggesting that local food purchase and consumption may be an automated cognitive process as opposed to being preceded by an elaborate decision making process, such as the expectancy-value decisions associated with TPB. This is to say that local food consumption may be 'routine' for some individuals; weekly shopping trips to the FM, for instance, or automatically picking up local produce at the grocery store or food co-op rather than conventional, could be part of their normal routine. In addition, subscription to a CSA means that local produce is delivered on a routine basis. Habit strength has been associated with other nutrition-related behaviours, such as saturated fat consumption, [53] fruit and vegetable consumption [54] and soft drink consumption. [55] Work to further elucidate the relationship between local food

consumption and habit strength is required to validate this finding. Current behavior is influenced by PBC and MO2, but not by attitude or SN.

Direct effect on intention

Moral Obligations. A novel finding of this study is the relationship between moral obligations and intention to eat a local diet. Both MO1 and MO2 had a direct effect on intention to eat a local diet, however, because MO2 will be discussed in relation to indirect effects, only MO1 will be discussed in this section. The items that loaded onto the MO1 factor were related to helping local farmers, using less fossil fuels and creating less pollution. A study in the UK found that people generally endorse the idea of supporting their local farmer [34] and other work suggests that the relocalisation of food systems has occurred as a measure to protect local economies. [56] Local food consumers perceive that by supporting their local farmer they are also supporting the local economy. [29] As mentioned previously, there is a well-established relationship between local food consumption and environmental stewardship. [18,36,57] This may help explain why some individuals perceive a moral obligation to eat local foods to help protect the environment.

Indirect effects on intention

Perceived Behavioural Control. Data from this study illustrates the powerful impact of the direct measure of PBC over intention to eat a local diet. This effect is mediated via current behavior (or habit). The direct measure is predicted by a more specific set of measures that include cost and access. Therefore, this finding is most likely associated with the limited availability of local food out with the usual operating hours of the Farmers' Market or other local food outlets and the perceived increased cost associated with local food. Given that local food is relatively prevalent in the Austin area, the perception of limited access may be exacerbated in other parts of the country where local food is less readily available. As reported in other work, access is often a barrier to local food procurement; consumers are inhibited by the limited availability and inconvenient shopping hours (typically Saturday mornings) of local food outlets [7,34,50]. A study conducted by Ross *et al*., [7] found that employees who participated in a farm-to-work program did so to overcome barriers to purchasing locally grown produce outside of the workplace. Furthermore, participations in box schemes or community-supported agriculture (CSA), where the farm products are delivered directly to the customer or a convenient collection point, may help overcome the access barrier for some people. [37] In addition, a Canadian study found that the introduction of a FM in an area that was considered to be a food desert improved access to healthy foods (fresh fruits and vegetables), and also reduced the cost of a 'healthy food basket' for that area. [45] The perceived additional cost of local food is also frequently cited as a barrier to local food

consumption.[34,40] A study of FMs in Philadelphia estimated that 53% were located in middle-high income areas, compared to only 29% in areas with a household income < $30,000. [40] The study also noted that a number of the FMs in low-income areas were supported by food justice organisations.[40] The clustering of FMs in affluent areas suggests that local foods are not affordable for everyone. The perception of local foods as being more expensive has been found elsewhere [34] but it is interesting to note that there were no differences in attitudes based on socioeconomic status. Based on findings from our elicitation study, we know that although participants perceived that the cost of local food to be more than at the grocery store, they believed that the other benefits of eating locally (better nutrition, taste etc…) outweighed the financial costs.

Moral Obligations. MO2 had the second largest indirect effect on intention to eat a local diet. Again, the items that were retained in this factor were regarding personal and family health, as well as the health of the land. Others have demonstrated the link between food consumption choices and morality in the context of fast food [43] and raw milk [20], for example. Similarly to the way that fast food is judged as being a poor eating choice and is often associated with obesity and even immorality [43], it could be argued that local food is the antithesis, conjuring up notions of healthy living and concern for ones own health as well as the health of the environment and the local community. Therefore, eating locally can be considered to be a moral behaviour that people use to convey a positive image of their self, demonstrating their awareness of the difference between 'good' and 'bad' food choices. [20] Studies investigating local food and health or

nutritional outcomes represent a gap in the literature on local foods, however, previous research on adolescents who supported alternative food production practices (organic, non-processed local, non-GMO) has shown that adolescents who identify with ≥ 2 alternate food practices are more likely than their peers to achieve the Healthy People 2010 guidelines and are more likely to avoid fast food.[24] Furthermore, this study found that supporters were significantly more likely to meet the guidelines for lower total and saturated fat consumption, greater fruit and vegetable consumption and greater adherence to 5 or more daily serving of fruits and vegetables. [24] Interestingly this group also reported being significantly more interested in healthy food and health overall.[24] In addition a study of Swedish adults, which also used the TPB as the theoretical framework, found that concern for one's own or family health was the strongest predictor of attitudes towards, and purchase intention of selected organic food. [35] Furthermore, health was an important predictor of purchase frequency of organic products. [35] In contrast, Zepeda and Li [29] found that attitudes towards nutrition and health had no significant effect on the probability of buying local. However, the difference between Zepeda and Li's work and the current study may be accounted for by the enormous growth in awareness of local foods in recent years. [3]

A finding unique to this study is the apparent connection between local food and the obligation to protect the health of one's family. Work to determine the demographic characteristics of local food consumers has indicated that those who prefer to buy local foods are also more likely to have children living at home. [48] It is generally accepted that

women are responsible for most family food-work and the nourishment of self and family. If women perceive that local food is more nutritious and/or healthy, this may help explain why they feel compelled to feed it to their families.

Finally, the last item in the MO2 factor was related to health of the land. The relationship between local food consumption and environmental stewardship has been well documented. For instance, Lea and Worsley [57] found that eating locally was one of the most commonly performed environmentally friendly food-related behaviours among the general population. Eating locally was perceived to have more of a positive environmental impact than choosing organically produced foods or reducing meat consumption. [57]

Limitations

This study provides insight into the behavioural, normative and control beliefs, as well as moral obligations, associated with local food consumption. However, this study was not conducted using a nationally representative sample and therefore these findings cannot be extrapolated to the population as a whole. The study is further limited by the relatively small sample size (n=114). Furthermore, to fully understand the contribution of habit in guiding local food consumption, a validated measure of habit should be included in future work in this area.

Implications for future research

The results of this study will be used to correlate psychosocial determinants of local food consumption with indicators of diet quality (such as the Healthy Eating Index) using dietary assessment data that was collected in parallel with this study. These findings may also be useful in determining how to incorporate local food messages into intervention and nutrition education initiatives.

4. ARTICLE THREE – LOCAL FOOD INTAKE IS ASSOCIATED WITH HIGHER HEALTHY EATING INDEX SCORE

INTRODUCTION

Recently, nutrition professionals have begun to incorporate messages about local food into nutrition education messages and interventions. [26,27,44,45,47] This is a reflection of the large increase in the number of farmers' markets (FM) and community gardens (CG) in the country, [3] which in turn represents growing consumer demand for locally grown foods. Despite the growing popularity in using FM and CG as a strategy to increase fruit and vegetable consumption, little is know about their influence over dietary intake. Given that less than a quarter of Americans meet their daily fruit and vegetable intake recommendations, [46] it is worthwhile investigating the role of local food in reducing this deficiency. Preliminary studies suggest that local foods may help improve access to, and increase consumption of fruits and vegetables. [44,45] However, the majority of these studies are limited to participants of supplemental nutrition programs, such as the Farmers' Market Nutrition Program (FMNP) for women enrolled in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), and the farmers' market programs for seniors US Department of Agriculture Senior Farmers' Market Nutrition Program (SFMNP). In 2010, the American Dietetic Association published a review of the nutritional implications of farmers' markets (FMs) and community gardens (CGs). [21] The authors concluded that although some studies suggest

that FMs and CGs may improve intake of fruits and vegetables, these studies were limited because they had not used validated dietary assessment instrumentation, such as 24-hour recalls or food frequency questionnaires. Studies were further limited by weak study designs, that oftentimes did not include sufficient control groups or repeated measures. The current study therefore seeks to identify dietary patterns associated with increasing amounts of local food in the diet. Using the Automated Self- Administered 24-hr Recall (ASA24) tool developed by the National Cancer Institute, a Healthy Eating Index 2005 (HEI-2005) score was applied to each category of local food consumption for comparison of diet quality across groups.

MATERIALS AND METHODS

Participants were recruited in the Austin, TX area where there is a large and well-established local food movement. Two recruitment procedures were implemented; in-person and online. Participants (n= 186) were recruited from a variety of places; around 45 people were recruited from a coffee shop and a further 50 were recruited while shopping at a Farmers' Market. The remaining participants were recruited via 3 different food-related email groups (including a Community Supported Agriculture scheme's online newsletter). The online approach was adopted when an insufficient number of participants enrolled in person. The Texas A&M Institutional Review Board approved the study protocol and all participants provided written informed consent. In-person recruitment involved a verbal explanation of the study requirements followed by the

participants reading and signing the consent form. Participants were offered a $10 Visa gift card for successfully completing the study (all recalls and questionnaire). Contact information, including telephone number, email and home address were also collected at this point. After obtaining informed written consent, participants were given questionnaire, which measured sociodemographic background, and a return envelope and asked to return the questionnaire at their earliest convenience. Those who were recruited via email were asked to read the consent form before emailing their contact information. Once contact information had been received, two copies of the consent form and a copy of the questionnaire were posted to the participant. The participant was asked to return the questionnaire and a signed copy of the consent form at their earliest convenience. All participants were contacted by email to verify that their email address was correct, as this was the primary means of communication with participants. Those who did not respond by email were contacted by telephone and asked to verify their email address that way.

Measures

Demographics. These were self-reported and consisted of age, sex, height, weight, race/ethnicity, education, marital status and household income.

Current Behaviour. Participants reported their average weekly household food bill and what percentage of their diet was composed of local foods (0%, 1-19%, 20-39%, 40-59%, 60-79%, 80-100%).

Dietary Assessment. Participants were asked to complete eight self-administered 24-hr recalls online using the National Cancer Institute's Automated Self Administered 24-hr recall (ASA24) system (Version 1). Recalls were split up into two sets of four recalls, which were conducted seven weeks apart. The reason for this was to attempt to capture seasonal variation in the diet. During each set of four recalls, one weekend day and three weekdays were assessed. A few days before recalls began, participants were sent an email to alert them that they will be asked to do four recalls within the next week to ten days and reminded them to check their email frequently during this period. The researcher then chose recall days at random. Early (around 7am) on the morning of a recall, participants were contacted by email and were requested to log on to the ASA24 software using the username and password that had been assigned to them. Participants then had until midnight of that day to complete the recall for the previous day's food and drink. For an overview of the ASA24 software please see: http://riskfactor.cancer.gov/tools/instruments/asa24/respondent/methodology.html

On the day of every recall, participants were reminded to record ALL of the food and drink that had been consumed in the previous 24-hr period and that if they had any questions about the software or could not find a suitable alternative for a missing food to contact the researcher immediately. In addition, participants were reminded to return

their questionnaires if they had not already done so. At the end of each set of recalls, 'make-up' days were scheduled for participants who were unable to complete a recall on the specified day. Make-up days were available on either weekend or weekdays depending on the day the respondent missed. Participants were contacted approximately 3-4 times by email to complete make-up recalls.

Healthy Eating Index. MyPyramid Equivalents (MPEs) from all foods reported were used to create HEI-2005 variables and scores. The HEI-2005 is composed of 12 component scores, each representing a different aspect of the diet (Total Fruit, Whole Fruit, Total Vegetables, Dark Green and Orange Vegetables and Legumes (DOLs), Total Grains, Whole Grains, Milk, Meat and Beans, Oils, Saturated Fat, Sodium, and Calories from Solid Fat, Alcoholic Beverages and Added Sugars (SoFFAs)) . The scores for each of the components are scored separately and then summed to give a total HEI-2005 score. The components of the HEI-2005 are considered to be of two types. The food-group and Oils components are the "adequacy components" because the recommendations on which they are based were established to ensure adequacy of nutrient intake. The "moderation components" are Saturated Fat, Sodium, and Calories from SoFAAS and higher scores are awarded for lower intakes. [6] Because dietary recommendations vary depending on energy requirements, component scores are assessed on a density basis; that is, amounts per 100kcal of energy, or percentage of energy. The HEI-2005 employs diet quality standards derived from the 2005 Dietary Guidelines for Americans [58] and the MyPyramid food guide. [59]

Analysis

Individuals' intake of Calories from SoFAAS was calculated using the discretionary solid fat and added sugars data from MPEs. Since the MPEs report number of drinks as opposed to number of calories, each drink was assigned an average value of 200 calories. Therefore, the SoFFA category was calculated as follows: solid fat calories = solid fat (g) x 9 calories/g, added sugar calories = added sugar (tsp) x 4 grams/tsp of granulated sugar x 4 cal/gram of granulated sugar, alcohol calories = total drinks of alcohol x 200 calories/drink. [6,60] For each HEI-2005 component, a density value for the intake of food group or nutrient of interest was created. To do so, the amount of the food or nutrient reported is divided by the total daily intake and multiplied by 1000. Thus, it is (total food group equivalent or nutrient intake/total energy intake) * 1000. Percentage of calories from saturated fat and SoFAAS were also calculated. For each component, the density value is compared with the standard established for the component, and the HEI-2005 component score is determined. For participants where more than one day's worth of 24-hour recall existed, the mean intake value was used to calculate the density value. Depending on the component, the component score may have a maximum value of 5, 10, or 20 points (see table 3). [6,60] The total and component HEI-2005 scores were then used as the dependent variable in a multiple regression model, with % local food as the independent variable, as well as the control variables age, sex, income and education.

RESULTS

In total, 114 participants returned their questionnaire. Participants had a mean age of 36 years (SD= 12.1 years) and a mean body mass index (BMI) of 23.8 (SD=4.6). Additionally, 75.2% were female. Participants were primarily Caucasian (84%) and 83.1% had either a college degree or an advanced degree. Mean income was between $40,000 - $70,000.

Table 3 shows the number of participants who completed recalls during each of the two rounds of recalls, with the percentage of the recruited sample reported in parenthesis. Altogether, 112 participants completed one or more recalls during the first phase of the study and 53 completed one or more recalls during the second phase of the study. This gives a response rate of 60.2% and 28.5% for each phase, respectively. Table 4 shows the number of participants who self-reported with each level of local food consumption with the percentage of the sample who completed a recall in each category reported in parenthesis.

Table 3. Recalls completed in phases 1 & 2 of the study.

	4 Recalls	3 Recalls	2 Recalls	1 Recall	0 Recalls
Phase 1	67 (36%)	6 (3.2%)	18 (9.7%)	13 (6.9%)	74 (39.8%)
Phase 2	35 (18.8%)	4 (2.2%)	7 (3.8%)	7 (3.8%)	133(71.5%)

Table 4. Participants' self-reported local food intake.

% Local Food In Diet	0-20%	21-40%	41-60%	61-80%	81-100%
Number of Participants	32 (28.6%)	20 (10.6%)	30 (26.8%)	23 (20.5%)	9 (8%)

Once merged with survey data, only 88 records were available for participants who had completed dietary assessment and had retuned a survey. That is to say, some people who completed recalls did not return their questionnaire and so data on the amount of local food in their diet as well as sociodemographic variables is missing. This makes the final response rate for the study 47.3%. Given the low response rate for dietary assessment in phase two of the study, these results will not be presented here.

Healthy eating index scores

Table 5 summarises the mean total and component scores for the sample. The mean component and total HEI-2005 score calculated from the National Health and Nutrition Examination Survey (NHANES) (2001-02) is also provided as a comparison. [61] Although the sample mean total score from this study is similar to the nationally representative sample, there are differences in the means of component scores. This suggests differences in the quality of the diets, particularly in terms of dark green and

orange vegetables and legumes and total vegetables, and from calories from SoFFAs and saturated fat.

Table 5. Mean HEI-2005 Component and Total Scores for sample and NHANES 2001-02.

HEI-2005 Component (Maximum Score)	Mean Score (SD)	NHANES 2001-02 Score [61]
Total Fruit (5)	3.1 (1.9)	3.1
Whole Fruit (5)	3.4 (1.9)	3.4
Total Vegetables (5)	4.1 (1.3)	3.2
Dark Green and Orange Vegetables (5)	3.2 (1.8)	1.4
Total Grains (5)	3.9 (1.4)	5.0
Whole Grains (5)	1.9 (1.6)	1.0
Milk (10)	5.4 (3.2)	6.3
Meat (10)	8.7 (2.2)	10.0
Oil (10)	7.9 (2.3)	6.8
Saturated Fat (10)	2.9 (3.9)	6.4
Salt (10)	2.5 (2.3)	4.1
SoFFAs (20)	11.0 (7.3)	7.5
Total (100)	58.4 (12.5)	58.2

Multiple Regression Analysis

Table 6. Beta coefficients for model variables and the adjusted R^2 for the models.

	Total Vegetables	Dark Green and Orange Vegetables and Legumes	Saturated Fat	HEI-2005 Total Score
% Local Food	0.199	0.368 ***	0.273 *	0.279 *
Age	-0.169	0.138	-0.072	0.139
Sex	0.165	0.040	-0.054	0.086
Education	0.212	0.196	-0.234	0.085
Income	0.068	-0.127	0.046 *	-0.306 *
Adjusted R^2 for model	0.103 *	0.143 **	0.075 *	0.085 *

Note. * P <0.05, ** P < 0.005, ***P< 0.001

Table 6 shows the results of multiple regression analysis of statistically significant component and total HEI-2005 scores with the self-reported measure of percentage of local food in the diet. The control variables age, sex, education and income were also included in the model. Results indicate that as the percentage of local food in the diet increases, so too do the amount of dark green and orange vegetables and legumes, in the diet, and the overall HEI-2005 score. Since saturated fat is a moderation component, an

increased score indicates better compliance with the dietary guidelines. The above results therefore indicate that as percentage of local foods in the diet increases, the number of calories from saturated fat decreases. None of the independent variables in the total vegetables model were statistically significant. Colinearity was suspected between education and income in the model and when income was removed, sex became the only significant variable suggesting that local food does not have a bearing on total vegetable intake. A paired samples t-test was performed to establish whether there was a difference between the means HEI score of individuals whose diet was ≤59% local food and those whose diet was ≥60% local food. The high local food group had a mean HEI score, which was statistically significantly higher than the low local food group (P= 0.0061).

Also of interest, fibre, potassium, and β carotene were significantly positively correlated with local food intake (r=0.28, 0.23 and 0.20 respectively). This further reinforces the relationship between DOLs and local food consumption, given that these nutrients are major constituents of these foods.

DISCUSSION

As illustrated above, a higher percentage of local foods in the diet may help improve overall diet quality as measured by the HEI-2005, an indicator of compliance with federal dietary guidance. Furthermore, local food may help improve aspects of the diet,

which are farthest from current recommendations, such as dark green and orange vegetables and legumes, and saturated fat intake. [6]

Studies have demonstrated the link between a higher HEI-2005 score and positive health outcomes. For instance Reedy *et al.,* found that women with the highest HEI-2005 scores in the National Institutes of Health-AARP Diet and Health Study had the lowest incidence of colorectal cancer (as compared to those who had the lowest HEI-2005 scores) over a five-year follow up period. [62] Furthermore, among the four different indexes that the authors calculated scores for, the HEI-2005 scores were the most predictive of colorectal cancer risk among women. For men, however, a decreased risk of colorectal cancer was comparable across all four indexes when comparing men with the highest and lowest scores. [62] The relative risk for colorectal cancer for men and women with the highest HEI-2005 scores was 0.63 and 0.69 respectively. [62]

In the Health Professionals follow-up study, participants with the highest HEI-2005 scores (top quintile) had a 28% lower cardiovascular disease (CVD) risk than those with the lowest scores (bottom quintile). [63] Similarly, those in the highest quintile of HEI-2005 scores in the Nurses' Health Study had a 14% lower risk of CVD than those in the lowest quintile. [64] In contrast, de Koning *et al.,* noted that among four dietary indexes, the HEI-2005 was the only measure not significantly associated with reduced risk of type-2 diabetes (T2D) in the Health Professionals follow-up study. [65] The authors

therefore suggest that total HEI-2005 scores are associated with blood lipids and blood pressure, but not insulin resistance. [65]

The Nurses' Health Study did find that T2D risk was inversely associated with green leafy vegetable intake. [66] It may therefore be more useful to look at component scores (such as DOLs) rather that total HEI-2005 scores, however, most studies overlook this in their analyses. National data from NHANES (1999-2000) and the Continuing Survey of Food Intake by Individuals (CSFII) (1994-1996) suggest that intake of DOLs is around one-third of the recommendation. [67] The 2010 Dietary Guidelines For Americans Advisory Committee (DGAC) therefore made increased consumption of this subgroup a priority in their report. [68] Increased consumption of DOLs is positively associated with the shortfall nutrients vitamins A, C, and K, as well as dietary fibre. [68] Results from the current study suggest that promoting local foods may be strategy to help increase DOLs in the diet and subsequently improve the intake of select shortfall nutrients.

The DGAC report also highlights that the intake of saturated fat exceeds recommendations for over half of the U.S. population. [68] This is a public health concern due to the well-established positive relationship between saturated fat intake and increased serum total and LDL cholesterol and increased risk of CVD, as wells as increased markers of insulin resistance and increased risk of T2D. [68] Conversely, decreased saturated fat intake is associated with lower CVD and T2D intake. [68] In contrast to this study, other work has found a positive association between local food

consumption, fat and vegetable intake among participants using WIC FMNP vouchers. [69] The authors suggest that this is a result of participants using full-fat salad dressings on vegetables [69] and that this should be addressed in nutrition education messages aimed at this population, and indeed any nutrition education messages relating to local food consumption.

Although no work to date has directly measured the relationship between local food consumption and body mass index (BMI), a study by Salois suggests that a strong local food economy may play an important role in obesity and T2D prevention. [70] This finding was not reinforced in this study however, as no relationship between local food and BMI was detected. This suggests that other factors may be at play, such as the role of fibre and vitamins A, C and K from DOLs and T2D prevention.

Limitations

This study is limited by the large loss to follow up experienced between phase 1 and phase 2 of the study. As mentioned previously, both time points were measured, not only as a repeat measure, but in order to assess seasonal variation in the diet. The main reason for drop off given by participants was due to the ASA24 software. Participants complained that the software was cumbersome and slow and that recalls were time-consuming to complete. They were also frustrated by the animated character designed to assist with recalls; after the first recall this became redundant yet participants were

forced to listen to it each time they logged in, further slowing them down. Another limitation is the non-nationally representative sample meaning that these findings may not be extrapolated to other areas outside of Austin. Furthermore, although no differences in attitudes were detected among each level of local food consumption in this study, this may not be the case in other areas where local food is less ubiquitous. Finally, a drawback of this study is that participants were contacted primarily by email and there is the possibility that emails were automatically deleted or sent to spam mail filters. This and the cumbersome software both help account for the large loss to follow-up experienced in this work.

Implications for future research

Results from this study suggest that as the amount local food in the diet increases, adherence to federal dietary guidance also increases, as measured by the HEI-2005. Specifically, local food seems to improve the intake of dark green and orange vegetables and legumes. Furthermore, it is inversely associated with saturated fat intake. These findings indicate the need for more research to further elucidate the relationship between local food intake and dietary outcomes. Specifically, studies employing a large, nationally representative sample are warranted. Furthermore, this study may have implications for policy, particularly for the WIC FMNP. Currently WIC FMNP participants can only spend between $10-$30 per annum at FMs depending on the state. Future research should investigate the effect of relaxing these restrictions on fruit and

vegetable intake among this population. Furthermore, efforts should be made to encourage state agencies to authorise FMs, individual farms and farm stands to be eligible to accept WIC benefits. Decreasing barriers to FMs accepting the USDA's Supplemental Nutrition Assistance Program's (SNAP) electronic benefits and relaxing the restrictions on how much can be spent may also help improve fruit and vegetable intake and reduce saturated fat consumption in this population. Mobile FMs may also help reduce barriers to access and their contribution to

5. SUMMARY AND CONCLUSIONS

SUMMARY

Using focus group methodology, this research identified the behavioural, normative and control beliefs associated with consuming a local diet. Using these findings as a platform, a questionnaire was developed to quantify attitudes, subjective norms, and perceived behavioural control, the theoretical constructs of the Theory of Planned Behaviour (TPB). In addition, moral obligations were measured for the first time in relations to local food consumption in an extended TPB model. The sample consisted of 114 individuals consuming various levels of local food in the Austin, TX area. Results indicate that perceived behavioural control and moral obligations had both a direct effect on intention to consume local food, as well as an indirect effect on intention, which is mediated via current behaviour. Dietary analysis was conducted using an online dietary assessment tool, the National Cancer Institute's Automated Self-Administered 24-hr recall. Between one and four recalls were collected from participants and a mean Healthy Eating Index (HEI) score was applied. Findings suggest that while controlling for age, sex, income and education, as the amount of local food in the diet increases, the total HEI score and the Dark Green and Orange Vegetables and Legumes (DOLs) component score also increases. In addition, the Saturated Fat component score increases, indicating lower intakes of saturated fat are associated with higher local food

intake. This suggests that saturated fat in the diet is being displaced by local vegetable intake, particularly DOLs.

CONCLUSIONS

This work provides numerous insights into the behavioural, normative and control beliefs associated with eating locally. To date, no other work uses the Theory of Planned Behaviour to explore intention to consume local foods in a general population or addresses the relationship between moral obligations and local food consumption. This work contributes to the literature on local food purchasing intention and therefore may be useful for nutrition professionals who would like to include a local food component in an intervention study. Similarly, it could serve to assist in the design of nutrition education materials for supplemental nutrition programmes such as the Senior Farmers' Market Nutrition Program or the Special Supplemental Nutrition Program for Women, Infants and Children (WIC) Farmers' Market Nutrition Program.

In our model, perceived behavioural control and moral obligations were significant, whereas the standard TPB variables, attitudes and subjective norms, were not. Although disappointing, this is not untypical of studies using TPB, the three primary constructs are rarely all significant.

As illustrated above, a higher percentage of local foods in the diet may help improve overall diet quality as measured by the HEI-2005, an indicator of compliance with

federal dietary guidance. Furthermore, local food may help improve aspects of the diet, which are farthest from current recommendations, such as dark green and orange vegetables and legumes, and saturated fat intake. Findings indicate the need for more research to further elucidate the relationship between local food intake and dietary outcomes. Specifically, studies employing a large, nationally representative sample are warranted. This work may have implications for policy, particularly for the WIC FMNP. Currently WIC FMNP participants can only spend between $10-$30 per annum at FMs depending on the state. Future research should investigate the effect of relaxing these restrictions on fruit and vegetable intake among this population. Furthermore, efforts should be made to encourage state agencies to authorise FMs, individual farms and farm stands to be eligible to accept WIC benefits. Decreasing barriers to FMs accepting the USDA's Supplemental Nutrition Assistance Program's (SNAP) electronic benefits and relaxing the restrictions on how much can be spent may also help improve fruit and vegetable intake and reduce saturated fat consumption in this population. Furthermore, given that the perceived barrier of access may limit intention to consume local food, efforts should be made to improve access to FMs and other local food outlets. For instance, placing bus stops near FMs or extending opening hours of markets. Having mid-week neighbourhood markets is another strategy that could help improve access and this would probably be most successful when used in tandem with supplemental food assistance programmes to help overcome the perceived barrier of cost.

Given that the environmental HEI-2005 score (the score applied to the U.S. food supply) is too low to support higher HEI scores in the population, local food production should be considered as a potential solution. This could be achieved by providing incentives and subsidies to small and local farmers.

Future analysis of data from the projects described here will aim to use TPB constructs to help predict HEI-2005 score. Future research in this area should include a nutritional assessment on a nationally representative sample of local food consumers and non-local food consumers. Ideally this would include the use of a more sensitive dietary assessment tool, such as a food diary, which may also be more acceptable to participants and help reduce their burden and therefore improve response rates. Furthermore, intervention studies that determine if reducing the perceived barriers to local food consumption (cost/access) actually result in 1) improved participation in local food outlets (such as FMs) and 2) improved nutrition and/or health outcomes.

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APPENDIX A

The following 12 pages show the questionnaire developed from Article One and used in Articles Two and Three.

Texas A&M University
Intercollegiate Faculty of Nutrition

Texas Local Food Study

Beliefs and Attitudes Regarding Local Food

Please read the following section carefully.

Survey Instructions: Please answer questions by circling the appropriate number or by filling in the appropriate blank. More than one answer choice may apply to you, so please be sure to read all of the choices before making the selection that is most applicable to you. You are not obligated to answer questions that for any reason make you uncomfortable. Your responses to this survey are confidential; please do not write your name on the questionnaire.

If you would like to comment on any question or explain any of your answers, then please do so in the space provided at the back of the survey. Please return the completed questionnaire in the enclosed postage-paid envelope.

Address any correspondence to:

Laura Thomas
Local Food Study
600 John Kimbrough
Room 444 AGLS Building
College Station, TX 77843-2253

Thank you for your cooperation.

Working definitions (please refer to this page when answering the questions)

Immediate Family: This may refer to your children, siblings and/or parents.

Conventional/Non-local foods: These are foods that are not grown or produced in the local area. They are typically imported from other countries or states. For example, tropical fruits like mangoes and pineapples are not grown in Texas and have to be shipped in. Most foods that can be found in grocery stores have been shipped to the store and are not local. Processed foods, canned and frozen foods found in the grocery store are almost never local.

Local Diet: A diet that is made up mostly of local foods

Dietary variety: Refers to how much choice and selection one has in their diet. If a person has little dietary variety then they tend to eat the same few things over and over again.

Community: Local community is the town or city you live in and the immediate surrounding countryside and the people who reside there.

Social Justice: the availability of equal rights and equal access to opportunities.

Food Insecurity: Refers to a strong likelihood of hunger or starvation because an individual cannot afford food for themselves and their families.

Beliefs and Attitudes Regarding Local Food: Texas Local Food Survey

The purpose of this study is to inform farmers, local food advocates, the food industry, and researchers in the fields of food and nutrition about the views people hold with regards to local food in light of the growing local food movement.

There is no strict definition of a local food, but when people refer to a local food, they typically mean something that has been grown (in terms of produce) or produced (in the case of meat and eggs) within their county or neighbouring counties.

Local foods can be bought directly from the farm via a farm stand or a Community Supported Agriculture box scheme. Some people buy directly through the farm via a cow-share (for milk) or a chicken-share (for meat and eggs). Alternatively, local food can be obtained at a Farmers' market. Foods that are grown at home or in a community garden are also considered to be local. Some restaurants and cafés buy locally grown food directly from the farmer, and use them in their menu offerings. Furthermore, local foods may be available in some grocery stores; you can check the signs at the store to find out if that item came from nearby.

Local farms typically plant a wide variety of different crops rather than a monoculture (production of a single crop over a large area). Local foods are seasonal, meaning that tomatoes and peppers are available in the summer months, but not during the winter when greens are in season.

Section 1 of 7: Beliefs About Local Food

The following questions measure the strength of your beliefs and attitudes about eating local food. There are no right or wrong answers; we are looking for your opinion.

Q1. Please indicate how strongly you agree or disagree with each of the following items.

		Strongly Disagree						Strongly Agree
a.	Local food is better for my health than conventional, store-bought food	1	2	3	4	5	6	7
b.	Local food is more nutritious than conventional, store-bought food	1	2	3	4	5	6	7
c.	Local food tastes better than conventional, store-bought food	1	2	3	4	5	6	7
d.	If I eat local food, I am reducing my negative impact on the environment	1	2	3	4	5	6	7
e.	Eating local food gives me more variety in my diet	1	2	3	4	5	6	7
f.	By eating local food, I feel like I am part of a community	1	2	3	4	5	6	7
g.	By eating local food, I am reducing my dependence on fossil fuels	1	2	3	4	5	6	7
h.	By buying local food I am supporting the local economy	1	2	3	4	5	6	7
i.	Supporting local food contributes to social justice	1	2	3	4	5	6	7
j.	Local food networks help reduce food insecurity	1	2	3	4	5	6	7
k.	Local food does not rely as heavily on chemicals (pesticides/ herbicides) as does non-local, store bought food	1	2	3	4	5	6	7
l.	Local food is safer to eat than conventional, store-bought food	1	2	3	4	5	6	7

Q2. Please indicate how desirable or undesirable each of the following items is for you

		Extremely Undesirable						Extremely Desirable
a.	Doing something positive for my health	1	2	3	4	5	6	7
b.	Eating food that is nutritious	1	2	3	4	5	6	7
c.	Eating food that tastes good	1	2	3	4	5	6	7
d.	Reducing my negative impact on the environment	1	2	3	4	5	6	7
e.	Variety in my diet	1	2	3	4	5	6	7
f.	Belonging to a community	1	2	3	4	5	6	7
g.	Reducing my dependence on fossil fuels	1	2	3	4	5	6	7
h.	Supporting the local economy	1	2	3	4	5	6	7
i.	Social justice	1	2	3	4	5	6	7
j.	Reducing food insecurity	1	2	3	4	5	6	7
k.	Eating food that uses minimal chemicals (pesticides/herbicides)	1	2	3	4	5	6	7
l.	Eating food that is safe for consumption.	1	2	3	4	5	6	7

Q3. Please select the most appropriate ending to the sentence from each of the four scales below.
For me, eating local food is:

Harmful	1	2	3	4	5	6	7	Beneficial
Bad	1	2	3	4	5	6	7	Good
Unpleasant	1	2	3	4	5	6	7	Pleasant
Worthless	1	2	3	4	5	6	7	Useful

Section 2 of 6: Other's Expectations

The following questions will ask if other people expect you to eat local food.

Q1. Please indicate how strongly you think that each of the groups or individuals below would like you to eat local foods.

			Not at all						Very Much So
a.	Your spouse or significant other	N/A	1	2	3	4	5	6	7
b.	Your friends		1	2	3	4	5	6	7
c.	Your immediate family		1	2	3	4	5	6	7

Q2. In general, how important or unimportant to you is it that you meet the expectations of the following people?

			Not at all important						Very Important
a.	Your spouse or significant other	N/A	1	2	3	4	5	6	7
b.	Your friends		1	2	3	4	5	6	7
c.	Your immediate family		1	2	3	4	5	6	7

Q3. Most of the people who are important to me…

Don't care about whether or not I eat a local diet	1	2	3	4	5	6	7	Care strongly about whether or not I eat a local diet

Q4. Most of the people who are important to me expect me to eat a local diet…

Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree

Section 3 of 6: Constraints on eating local food

The following questions will ask about factors that affect your ability to eat local food.

Q1. a) Having limited access to local food is:

Unlikely	1	2	3	4	5	6	7	Likely

b) In general, local food is more expensive than the non-local food I can find in the grocery store:

Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree

Q2. a) Having limited access to local food makes it…

Much more difficult to buy local food	1	2	3	4	5	6	7	Not at all difficult to buy local food

b) If local food is more expensive than non-local food then I am…

Much less likely to buy local food	1	2	3	4	5	6	7	No less likely to buy local food

Q3. For me to eat a local diet is:

Difficult	1	2	3	4	5	6	7	Easy

Q4. I am confident in my ability to eat a local diet if I wanted to:

Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree

Q5. Whether or not I eat a local diet is entirely up to me:

Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree

Q6. The decision to eat a local diet is beyond my control

Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree

Section 4 of 7: Trust

This section will measure the level of trust you have in local foods.

Q1. a) I trust a local farmer…

Much less than a chain grocery store	1	2	3	4	5	6	7	Much more than a chain grocery store

b) I trust a local farmer…

Much less than a large food producer	1	2	3	4	5	6	7	Much more than a large food producer

c) Being able to trust my local farmer(s) is:

Not at all Important	1	2	3	4	5	6	7	Very Important

Section 5 of 7: Ethics

This section measures whether or not you believe you have a moral obligation to certain aspects of local food.

Q1. Please indicate how strongly you agree or disagree with each of the following items.

		Strongly Disagree						Strongly Agree
a.	I should buy local foods because this helps local farmers	1	2	3	4	5	6	7
b.	I should buy local foods because locally-produced foods do not have to travel long	1	2	3	4	5	6	7

	distances to get to me, less fossil fuels will be used							
c.	I should buy local foods because locally-produced foods do not have to travel long distances to get to me, less pollution will be produced	1	2	3	4	5	6	7
d.	I should buy local foods because locally-produced foods do not damage the land as much as conventional foods	1	2	3	4	5	6	7
e.	I should buy local foods because they will make my family healthier	1	2	3	4	5	6	7
f.	I should buy local foods because they will make me healthier	1	2	3	4	5	6	7

Section 6 of 7: Intention

This section measures your intention to eat local food in the next year.

Q1. How much of your diet do you <u>expect</u> to be made up of local food in the next year?

a. 0% ☐
b. 1-19% ☐
c. 20-39% ☐
d. 40-59% ☐
e. 60-79% ☐
f. 80-100% ☐

Q2. How much of your diet do you <u>want</u> to be made up of local foods in the next year?

a. 0% ☐
b. 1-19% ☐
c. 20-39% ☐
d. 40-59% ☐
e. 60-79% ☐
f. 80-100% ☐

Q3. How much of your diet do you <u>intend</u> to be made up of local foods in the next year?

a. 0% ☐
b. 1-19% ☐

c. 20-39% ☐
d. 40-59% ☐
e. 60-79% ☐
f. 80-100% ☐

Section 7 of 7: Demographics

The following questions are used to summarise the overall demographic features of the people who participate in our study.

Q1. What is your age in years? _____

Q2. What is your gender?

a. Male
b. Female

Q3. Please give a best estimate of your height: _____ ft _____ in
Q4. Please give a best estimate of your weight: _____ lbs

Q5. With which racial or ethnic group do you most closely identify yourself with?

a. Caucasian (white)
b. African American
c. Native American
d. Hispanic
e. Asian or Pacific Islander
f. Middle Eastern
g. Other

Q6. What is your highest level of formal education?

a. Less than a high-school diploma
b. High-school diploma or equivalent
c. Some College
d. Bachelors Degree
e. Graduate or Professional Degree

Q7. What is your current marital status?

a. Single, Never Married

b. Married
c. Separated
d. Divorced
e. Widowed

Q8. What is your total annual household income?

a. < $10,000
b. Between $10,000 and $40,000
c. Between $40,000 and $70,000
d. Between $70,000 and $100,000
e. >$100,000

Q9. a) As a child, were you involved in helping with a vegetable garden?

Yes/No

b) If yes, then please indicate whose garden(s) you helped with.

Parents	Yes	No
Grandparents	Yes	No
Other Relatives	Yes	No
Neighbours/ People in my community	Yes	No
Local School	Yes	No

Q10. Please select the option which best describes your definition of local food:

a. Anything grown/produced within a 100 mile radius of my home
b. Anything grown/produced within my/neighbouring counties
c. Anything grown/produced within 1 day's drive from my home
d. Anything grown/produced within the state of Texas
e. Anything grown/produced within the USA

Q11. a) Please estimate the average weekly household food bill.

$ _____

b) How many people live in your household?

_____

Q12. Approximately what percentage of your diet is made up of local food?

a. 0% ☐
b. 1-19% ☐
c. 20-39% ☐
d. 40-59% ☐
e. 60-79% ☐
f. 80-100% ☐

Q13. Do you consider all products under the 'Go Texan' * initiative to be local?

a. Yes b. No c. I am not familiar with this

*** Go Texan:** a marketing initiative sponsored by the Texas Department of Agriculture, whose purpose is to encourage consumers to seek and purchase Texas-made products. Products that fall under the Go Texan initiative are recognisable by this symbol:

Please use the space below to make any comments you may have about the survey.

Thank you for completing the Texas Local Food Survey. The research team is grateful for your participation in the study.

VITA

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